CLAIM AMENDMENTS

1   1. (original) A method for monitoring the contact
2   consumption in multiple contact switches having following features:
3   permanent storage of the values for the rated stage
4   voltage (U_S) of any possible switching, i.e. stage, of the
5   threshold values for the permissible contact consumption of the
6   switching contact as well as the resistor contacts as well as the
7   multiple contact switch-specific parameters a and b;
8   determination of the actual position n of the multiple
9   contact switch;
10   reading the stored value for the rated stage voltage (U_S)
11 which corresponds to the actual multiple contact switch position;
12   measuring the load current (I_L) at any switchover, i.e.
13 actuation of the multiple contact switch;
14   determination of the switching direction "up" or "down"
15 of the respective switchover;
16   determination which is independent of the switching
17 direction of the switched, fixed contact showing consumption
18   calculation of the switching currents of the breaking
19 contacts in an inherently known manner using the relationships
20      $I_{SK} = I_L/\text{ParSek}$
21      $I_{WK-A} = (U_S + I_L \times R_0/S_{res})/(2 \times R_0)$
22 for the switching direction "up" and
23      $I_{SK} = I_L/\text{ParSek}$

24            $I_{WK-B} = (U_S + I_L \times R_0/S_{res})/(2 \times R_0)$

25 wherein $U_S = - U_S$

26 for the switching direction "down,"

27 wherein ParSek represents the number of parallel sectors, R_0 the

28 magnitude of the transition resistance and S_{res} the resulting

29 current splitting;

30   calculation which is independent of the switching

31 direction of the respective consumption rates of the switching

32 contact (A_{SK}), of the respective resistor contact $(_{WK})$ as well as of

33 the breaking fixed contact according to the relationships

34            $A_{SK} = a_{SK} \times I_{SK}^{b} \times S_{SK}$

35            $A_{WK} = a_{WK} \times I_{WK-A}^{b} \times S_{WK}$

36            $A_{FK} = a_{FK} \times (I_{SK}^{b} + I_{WK-A}^{b}) \times S_{FK}$

37 for the switching direction "up" and

38            $A_{SK} = a_{SK} \times I_{SK}^{b} \times S_{SK}$

39            $A_{WK} = a_{WK} \times I_{WK-B}^{b} \times S_{WK}$

40            $A_{FK} = a_{FK} \times (I_{SK}^{b} + I_{WK-B}^{b}) \times S_{FK}$

41 for the switching direction "down;"

42   summing up the respective consumption rates (A_{SK}, A_{WK}, A_{FK})

43 to the respective total volume consumption $(GA_{SK}, GA_{WK-A}, GA_{WK-B}, GA^{re}_{FK-}$

44 $_n, GA^{I1}_{FK-m})$, non volatile storage of all summed up total volume

45 consumptions and comparison of these values with the respective

46 permanently stored threshold values;

47   generation of messages when the respective threshold

48 values or percentage limits thereof are exceeded.

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1   2. (original) A method for monitoring the contact

2   consumption in multiple contact switches having following features:

3   permanent storage of the values for the rated stage

4   voltage (U_S) of any possible switching, i.e. stage, of the

5   threshold values for the permissible contact consumption of the

6   switching contact as well as of the resistor contacts as well as

7   the multiple contact switch-specific parameters a and b;

8   calculation of the resistive component R as well as the

9   inductive component X of the transition reactance;

10   determination of the actual position n of the multiple

11   contact switch;

12   measuring the load current (I_L) at any switchover, i.e.

13   actuation of the multiple contact switch;

14   calculation of the circular current I_c as a partial amount

15   of the load current (I_L);

16   determination of the switching direction "up" or "down"

17   of the respective switchover;

18   determination which is dependent on the switching

19   direction of the switched fixed contact showing consumption

20   — determining whether the switching is effected from a non-

21   bridging to a bridging position or not;

22   calculation of the switching current of the breaking

23   contacts respectively with the relationships

24         $I_{SK} = I_L/2$

25   for a switching from non-bridging to bridging and

26    $I_{SK}=(I_L/2)x(R-jX)-jI_c$ or $I_{SK}=(I_L/2)x(R-jX)+jI_c$

27   in the alternative case;

28   calculation of the respective consumption rates of the

29   switching contact (A_{SK}) and the fixed breaking contact (A_{FK})

30   according to the relationship

31          $A_{SK} = a_{SK} \times I_{SK}{}^{b} \times S_{SK}$

32          $A_{FK} = a_{FK} \times I_{FK}{}^{b} \times S_{FK}$;

33   summing up the respective consumption rates (A_{SK}, A_{FK}) to

34   the respective total volume consumption (GA_H, GA_G, $GA^{re}{}_{FK-m}$, $GA^{Il}{}_{FK-m}$),

35   non volatile storage of all summed up total volume consumptions and

36   comparison of these values with the respective permanently stored

37   threshold values;

38   generation of messages when the respective threshold

39   values or percentage limits thereof are being exceeded.

1   3.   (new)   A method for monitoring contact consumption

2   in a multiple load selector switch with transition resistance and

3   having multiple fixed, breaking and resistor contacts, the method

4   comprising the steps of:

5   determining actual position of the multiple contacts;

6   measuring a load current during actuation of the multiple

7   contacts while displacing the multiple contacts between multiple

8   switching stages;

9   calculating a switching current of each of the contacts;

10   calculating a consumption rate of each of the multiple

11 contacts independently of the switching direction thereof;

12   summing up the calculated consumption rates, thereby

13 determining a total volume consumption; and

14   comparing the determined volume consumption to a

15 threshold value, thereby issuing a warning message upon reaching

16 the threshold value or a predetermined percentage thereof.

1   4. (new) A method for monitoring contact consumption in

2 a multiple load selector switch with transition reactance, the

3 method comprising the steps of:

4   calculating resistive and inductive components of the

5 transition reactance;

6   determining an actual position of multiple contacts of

7 the switch, the multiple contacts include fixed and breaking

8 contacts;

9   measuring a load current at any of multiple switchover

10 stages of the load selector switch upon actuation of the multiple

11 contacts thereof;

12   --calculating a circular current based on the load current;

13   determining a switching direction of the multiple

14 contacts between bridging and non-bridging positions thereof during

15 each switchover stage;

16   determining consumption rates of the respective multiple

17 contacts based on the determined switching direction; and

18   summing up the calculated consumption rates to determined

19   respective total volume consumption; and

20   comparing the stored total volume consumption to a

21   threshold, thereby issuing a warning signal if the total volume

22   consumption is at least equal to the threshold.